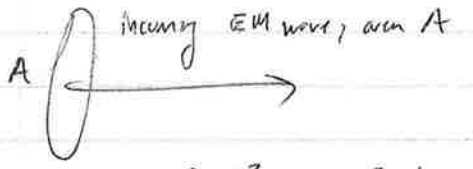
m12e2

$$\frac{\sigma_{tot}}{A_{inc}} = \frac{\langle P_{out} \rangle}{\langle P_{inc} \rangle}$$



$u = \varepsilon_0 E^2 \cos^2 \omega t$ $\quad I = c\langle u \rangle = c \frac{1}{2} \varepsilon_0 E_0^2$

so $\langle P \rangle = c \frac{1}{2} \varepsilon_0 E_0^2 A_{inc}$

$$\sigma_{tot} = \frac{P_{out}}{\frac{1}{2} \varepsilon_0 c E^2}$$

P_{out} by Larmor formula $\quad P = \frac{\mu_0 q^2 a^2}{6\pi c}$

find a of e^- due to $\vec{E}$ field (at $\frac{v}{c} \ll 1$, B correction negligible)

$F = qE \rightarrow a = \frac{q}{m} E \rightarrow$ (sq) $a^2 = \left(\frac{q}{m}\right)^2 E^2$

$$\langle a^2 \rangle = \left(\frac{q}{m}\right)^2 \langle E^2 \rangle$$

$$= \left(\frac{q}{m}\right)^2 \frac{1}{2} E^2$$

$$\sigma_{tot} = \frac{\mu_0 q^2}{6\pi c} \left(\frac{q}{m}\right)^2 \frac{1}{2} E_0^2 \frac{1}{\frac{1}{2} \varepsilon_0 c E_0^2}$$

$$\sigma_{tot} = \frac{\mu_0 q^4}{6\pi c^2 \varepsilon_0 m^2}$$